

IN THE CLAIMS:

Please amend the claims as follows:

1. (currently amended) An electromagnetic fuel injector, in which a hollow fixed core, an electromagnetic coil and a yoke are arranged from the center toward the outer diameter, a needle with a valve element is contained in a nozzle body fixed to the lower portion of the yoke, and the needle is urged toward a valve seat by the force of a return spring, the electromagnetic fuel injector characterized in that:

a fuel swirler positioned upstream of an injection orifice is disposed at the tip of the nozzle body, the fixed core and the nozzle body being coupled to each other ~~via through~~ a non-magnetic cylindrical seal ring press-fitted and welded to the outer circumference of one end on the nozzle body side of the fixed core and the inner circumference of one end of the nozzle body; and

the inner circumference of the fuel swirler and the inner circumference of the seal ring function as a guide for slidably guiding a stroke movement of the needle.

2. (original) An electromagnetic fuel injector according to claim 1, characterized in that the yoke and the nozzle body also are coupled to each other by press-fitting and welding.

3. (original) An electromagnetic fuel injector according to claim 2, characterized in that the seal ring has a flange at one end thereof, one end of a cylindrical portion on a side opposite to the flange is press-fitted and welded to one end of the outer circumference of the fixed core, while the flange is press-fitted and welded to an annular step formed at the upper end of the nozzle body; and

the yoke and the nozzle body are press-fitted in a spigot joint manner, followed by welding.

4. (currently amended) An electromagnetic fuel injector, in which an electromagnetic coil and a yoke are arranged around a hollow[,] cylindrical fixed core, a nozzle body containing therein a needle with a valve element is fixed to the lower portion of the yoke, and the needle is urged toward a valve seat by the force of a return spring, the electromagnetic fuel injector characterized in that:

the fixed core and the nozzle body comprise an assembly by being united through a non-magnetic cylindrical seal ring;

the electromagnetic coil and the yoke are arranged to be passed over the top of the fixed core and positioned configured in such a manner as to be fitted around the fixed core from above the fixed core;

the yoke can be is coupled to the upper end of the nozzle body in such a manner as to cover the top of the electromagnetic coil core;

a terminal taking-out window for the electromagnetic coil is formed at a part of the upper portion of the yoke; and

the inner surface of the upper end of the yoke presses the electromagnetic coil, ~~thus fixing thereby the coil is fixed between the outer surface of the assembly and the inner surface of the yoke.~~

5. (currently amended) An electromagnetic fuel injector according to claim 4, characterized in that ~~a bore of the upper end of the yoke is drawn, and the an~~ inner circumference of the upper end of a bore of the yoke through which the fixed core passes is coupled to the outer circumference of the fixed core by any of welding, press-fitting and caulking.

6. (currently amended) An electromagnetic fuel injector, in which an electromagnetic coil and a yoke are arranged around a fixed core, a nozzle body containing therein a needle with a valve element is fixed to the lower portion of the yoke, and the needle is urged toward a valve seat by the force of a return spring, the electromagnetic fuel injector characterized in that:

the fixed core and the nozzle body are coupled to each other ~~via~~ through a non-magnetic cylindrical seal ring extending over the outer circumference of one end of the fixed core and the inner circumference of one end of the nozzle body;

the inner circumference of the seal ring serves as a guide for the needle;

the needle has a hollow, cylindrical movable core, the outer circumference of the upper portion of the movable core being slidably guided on the inner circumference of the seal ring during a stroke movement, a fuel passage being secured between the outer circumference of the lower portion and the inner

circumference of the nozzle body, and the fuel passage communicating with another fuel passage defined inside of the movable core via a through hole formed at the movable core.

7. (original) An electromagnetic fuel injector according to claim 6, characterized in that the outer circumference of the lower portion of the movable core is made to be smaller in diameter than the outer circumference of the upper portion thereof so as to enlarge the fuel passage defined between the outer circumference of the lower portion and the inner circumference of the nozzle body, the through hole being formed on a core wall on which the outer circumference of the lower portion is positioned.

8. (currently amended) An electromagnetic fuel injector characterized in that:

a nozzle body, an orifice plate having an injection orifice and a fuel swirler are formed of separate members;

an inner circumference having a receiving surface for disposing the fuel swirler and the orifice plate is formed at one end on a fuel injection side of the nozzle body;

the fuel swirler is ~~loosely fitted to~~ is put in the inner circumference of the nozzle body with a clearance in such a manner as to be received at the receiving surface of the nozzle body; and

the orifice plate is ~~press-fitted~~ fitted and welded to the inner circumference in such a manner as to press the fuel swirler on the receiving surface, thereby the fuel swirler and the orifice plate are set into one end of the nozzle body in order of the fuel swirler, followed by the orifice plate.

9. (currently amended) An electromagnetic fuel injector characterized in that:

a nozzle body, an orifice plate having an injection orifice and a fuel swirler are formed of separate members;

an inner circumference having a receiving surface for disposing the fuel swirler and the orifice plate is formed at one end ~~on~~ of a fuel injection side of the nozzle body;

the fuel swirler and the orifice plate are set into one end of the nozzle body in order of the fuel swirler, followed by the orifice plate; and

the fuel swirler is held ~~between~~ by the receiving surface of the nozzle body and the orifice plate, ~~thus defining thereby~~ an annular fuel passage is formed between the outer circumference of the fuel swirler and the inner circumference of the nozzle body, so that fuel flows into a passage groove formed at the lower end surface of the fuel swirler via the annular fuel passage.

10. (currently amended) An electromagnetic fuel injector ~~according to~~ claim 8, characterized in that:

a nozzle body, an orifice plate having an injection orifice and a fuel swirler
are formed of separate members.

an inner circumference having a receiving surface for disposing the fuel
swirler and the orifice plate is formed at one end on a fuel injection side of the
nozzle body,

the fuel swirler is loosely fitted to the inner circumference of the nozzle
body in such a manner as to be received at the receiving surface of the nozzle
body,

the orifice plate is press-fitted and welded to the inner circumference in
such a manner as to press the fuel swirler, and

a guide groove for guiding the fuel to the outer circumference of the fuel
swirler is formed between the upper end surface of the fuel swirler and the
receiving surface of the nozzle body for receiving the upper end surface of the
fuel swirler.

11. (original) An electromagnetic fuel injector according to claim 10,
characterized in that the guide groove is formed at the upper end surface of the
fuel swirler and/or the receiving surface of the nozzle body.

12. (currently amended) An electromagnetic fuel injector ~~according to~~
~~claim 8,~~ characterized in that:

a nozzle body, an orifice plate having an injection orifice and a fuel swirler
are formed of separate members.

an inner circumference having a receiving surface for disposing the fuel swirler and the orifice plate is formed at one end on a fuel injection side of the nozzle body.

the fuel swirler is loosely fitted to the inner circumference of the nozzle body in such a manner as to be received at the receiving surface of the nozzle body,

the orifice plate is press-fitted and welded to the inner circumference in such a manner as to press the fuel swirler, and

the hardness of the fuel swirler is greater than that of the orifice plate.

13. (currently amended) An electromagnetic fuel injector according to claim 8, characterized in that:

a nozzle body, an orifice plate having an injection orifice and a fuel swirler are formed of separate members,

an inner circumference having a receiving surface for disposing the fuel swirler and the orifice plate is formed at one end on a fuel injection side of the nozzle body,

the fuel swirler is loosely fitted to the inner circumference of the nozzle body in such a manner as to be received at the receiving surface of the nozzle body,

the orifice plate is press-fitted and welded to the inner circumference in such a manner as to press the fuel swirler, and

a part of the orifice plate intrudes into the passage groove for generating a swirl, formed at the lower end surface of the fuel swirler.

14. (currently amended) An electromagnetic fuel injector in which a fuel swirler is disposed upstream of a fuel injection orifice, the electromagnetic fuel injector characterized in that:

the upper surface of the fuel swirler is equipped with fuel passage grooves for letting fuel flow from a center of the fuel swirler to an outer circumference thereof;

the lower surface of the fuel swirler is equipped with a passage grooves for generating a swirl to fuel and an annular passage communicating with the passage grooves for swirl at groove on an upstream side of the passage grooves are formed at the lower end surface of the fuel swirler;

the outer circumference of the fuel swirler is equipped with faces to be fuel passages for connecting the fuel passage grooves of the upper surface and the annular passage of the lower end surface.

15. (original) An electromagnetic fuel injector according to claim 14, characterized in that the annular passage is defined by forming an annular step at the peripheral edge of one end surface of the fuel swirler.

16. (original) An electromagnetic fuel injector, in which a hollow fixed core, an electromagnetic coil and a yoke are arranged from the center toward the

outer diameter, a needle with a valve element is contained in a nozzle body fixed to the lower portion of the yoke, and the needle is urged toward a valve seat with application of the force of a return spring, the electromagnetic fuel injector characterized in that:

a mass movable in an axial direction independently of the needle is interposed between the return spring and the needle.

17. (original) An electromagnetic fuel injector, in which a hollow fixed core, an electromagnetic coil and a yoke are arranged from the center toward the outer diameter, a needle having a valve element is contained in a nozzle body fixed to the lower portion of the yoke, and the needle is urged toward a valve seat by the force of a return spring, the electromagnetic fuel injector characterized in that:

a mass movable in an axial direction independently of the needle is interposed between the return spring and the needle, and a plate spring is interposed between the mass and the needle.

18. (currently amended) An electromagnetic fuel injector ~~according to~~ claim 9, characterized in that:

a nozzle body, an orifice plate having an injection orifice and a fuel swirl
er are formed of separate members.

an inner circumference having a receiving surface for disposing the fuel swirler and the orifice plate is formed at one end of a fuel injection side of the nozzle body,

the fuel swirler is held between the receiving surface of the nozzle body and the orifice plate, thus defining an annular fuel passage between the outer circumference of the fuel swirler and the inner circumference of the nozzle body, so that fuel flows into a passage groove formed at the lower end surface of the fuel swirler via the annular fuel passage, and

a guide groove for guiding the fuel to the outer circumference of the fuel swirler is formed between the upper end surface of the fuel swirler and the receiving surface of the nozzle body for receiving the upper end surface of the fuel swirler.

19. (previously presented) An electromagnetic fuel injector according to claim 18, characterized in that the guide groove is formed at the upper end surface of the fuel swirler and/or the receiving surface of the nozzle body.